Laboratory investigation of using and fouling and cleaning of polyethersulfone membranes employed in the removal of carboxymethylcellulose and poly(vinyl alcohol) from aqueous solutions

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ABSTRACT

One of the most significant environmental difficulties arising in textile industry is that of the rejection of water with great chemical load in important quantities, and one of the steps that generate pollution by increasing the COD of the textile industry effluent is the desizing step. Thus, the use of methods, which need weak chemical addition, such as ultrafiltration combined to a targeted selection of the sizing agents enables to reduce significantly the environmental impact of the desizing step of textile treatment engineering. Moreover, the wastewater rejected after the stage of desizing contains of valuable materials such as the carboxymethylcellulose and the poly(vinyl alcohol), which do not undergo notable changes in their physical properties nor their chemical properties during the processes of sizing and desizing. In fact, these two water-soluble polymers are more and more massively used in textile industry to replace the starch, which remains the most used natural sizing agent. The main objective of this paper is to expose experimental results obtained for several ultrafiltration polyethersulfone membranes employed in the removal of poly(vinyl alcohol) and carboxymethylcellulose from aqueous solutions, and to discuss the efficiency of enzymatic degradation of carboxymethylcellulose applied to treat the obtained ultrafiltrate and as well to clean the fouled membranes.

Keywords: Ultrafiltration; Membrane; Carboxymethylcellulose; Poly(vinyl alcohol); Enzymatic cleaning; Textile industry

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